15	47
18	48
24	49
25	50
28	54
36	54
42	72

out of 88

$\sqrt{\frac{50}{88}} * 88$

due after "winter" break

chapter 3 in Barrons

100+ derivative problems

Nov 13-7:31 AM

21) Find $f'(\theta)$ if $f(\theta) = \sin^2(2\theta^2-\theta)^3$

$$f(\theta) = \left[\sin(2\theta^2-\theta)^3\right]^2$$

chain rule

$$f'(\theta) = 2\left[\sin(2\theta^2-\theta)^3\right]^1 \frac{d}{dx}\left[\sin(2\theta^2-\theta)^3\right]$$

chain rule

$$= 2\left[\sin(2\theta^2-\theta)^3\right]\left[\cos(2\theta^2-\theta)^3\right]\frac{d}{dx}\left((2\theta^2-\theta)^3\right)$$

chain rule

$$= 2\left[\sin(2\theta^2-\theta)^3\right]\left[\cos(2\theta^2-\theta)^3\right]\left[3(2\theta^2-\theta)^2\right]\frac{d}{dx}(2\theta^2-\theta)$$

$$= 2\left[\sin(2\theta^2-\theta)^3\right]\left[\cos(2\theta^2-\theta)^3\right]\left[3(2\theta^2-\theta)^2\right]\left[4\theta-1\right]$$

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13) Given That $f(0)=4$ and $f'(0)=-1$
find an equation of the tangent line to the graph of $y=f(x)$ at the point where $x=0$.

to write the equation of a line:

slope $= f'(0)$ Pt: $(0, f(0))$

slope $= -1$ Pt $(0, 4)$

$y-4=-1(x-0)$

$y-y_0=m(x-x_0)$

$y=mx+b$
$y=-x+b$
$4=-(0)+b$
$4=b$
$y=-x+4$

14) $f(x) = x^2 + 1$

a) Average rate of change =

SLOPE = difference quotient = $\dfrac{f(x_2) - f(x_1)}{x_2 - x_1}$

NO LIMIT !

$= \dfrac{f(-1) - f(-2)}{(-1) - (-2)} = \dfrac{[(-1)^2 + 1] - [(-2)^2 + 1]}{(-1) - (-2)}$

$= \dfrac{[2] - [5]}{+1} = -3$

b) instantaneous rate of change = slope of tangent line = value of derivative

$f(x) = x^2 + 1$

$f'(x) = 2x$ AT $x = -2$

$f'(-2) = 2(-2) = -4$

Nov 13-7:33 AM

15) $f(x) = \begin{cases} x^2-5 & x \le 1 \\ x-5 & x > 1 \end{cases}$

$f(x) = 2x$ when $x \geq 1$

$\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$

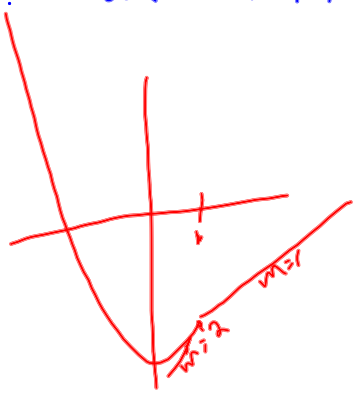
hmmm . . .

$f'(x) = \begin{cases} 2x & x < 1 \\ 1 & x > 1 \end{cases}$

$\lim_{x \to 1^-} f'(x) = \lim_{x \to 1^-} 2x = 2$

$\lim_{x \to 1^+} f'(x) = \lim_{x \to 1^+} 1 = 1$

$\therefore$ no derivative at 1



f(x) is continuous

1) f(x) is defined at x = 1

2) $\lim_{x \to 1^-} f(x) = \lim_{x \to 1^-} x^2-5 = -4$

$\lim_{x \to 1^+} f(x) = \lim_{x \to 1^+} x-5 = -4$

$\therefore$ two-sided limit exists $x \to 1$

3) $f(1) = \lim_{x \to 1} f(x)$

$\therefore$ f(x) is continuous at x = 1

4) [[and everywhere else]]